YATES & AUBERLE

ILD 005176441

The Drake Oak Brook Plaza
2215 York Road, Suite 114
Oak Brook, Illinois 60521
(312) 323-2162

September 24, 1984

Mr. Terry Ayers, P.E.
Quality Assurance Manager
Land Permit Section
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62706

RE: Central Quality Industrial Soil
and Groundwater Phase II Report

Dear Terry:

We are enclosing the Central Quality Industries Soil and Groundwater Sampling and Analysis Phase II Report. We proceeded with the Phase II program as developed and discussed at our meeting on February 15, 1984. We feel that the additional monitoring wells, soil borings, sampling and analysis adequately address concerns over potential soil and water contamination. As the Phase II Report indicates, there has been no long-term impact in the surface water or groundwater resulting from past disposal practices.

If you have any questions or comments concerning the Phase II Report, please contact me.

Sincerely,

John Yates

John J. Yates, P.E.

JJY/hk
Enclosure

cc: R.D. Hewes, CQI - Enclosure
R. Bartelt, Remedial Response Branch Chief,
U.S. EPA Region V, Chicago - Enclosure

SOIL AND GROUNDWATER SAMPLING AND ANALYSIS

Phase II Report

Submitted to:

Central Quality Industries
900 South Division Street
Polo, Illinois 61064

By:

Yates & Auberle
2215 York Road, Suite 114
Oak Brook, Illinois 60521

312/323-2162

September 12, 1984

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1.0 Introduction and Review of Phase I

Recognition of past waste disposal practices stimulated an investigation by Central Quality Industries (CQI) into potential soil and groundwater contamination at the plant site in Polo, Illinois. Beginning in 1983 a general survey was performed on soil and groundwater at and near an area where some land disposal of plant wastes had occurred. The results of this Phase I assessment are presented in Soil and Groundwater Sampling And Analysis: Phase I Report , February 28, 1984.

The Phase I study revealed above "background" levels of some chemical parameters in the soil, groundwater and small surface stream. Although no parameter was observed in alarmingly high concentrations, further investigation was required to characterize adequately the soil conditions at the plant. Of particular interest were the metals Chromium and Lead which were observed in the soil, groundwater and surface stream (ditch). A primary conclusion of the initial study was that an expanded investigation was necessary. The scope of the second phase was described in the Phase I report. This expanded investigation was

conducted in the spring and summer of 1984. The results are presented and discussed in this Phase II report.

2.0 Scope of Study - Phase II

The initial investigation of potential soil and groundwater contamination at CQI was extremely important. Many questions were answered (e.g., Xylene was eliminated as a concern); and some results were inexplicable with available data. (Where were the ditch contaminants originating?) Sites were selected in conjunction with the Illinois Environmental Protection Agency in an attempt to better characterize the extent and characteristics of groundwater contamination at CQI.

Soil borings were performed at some 10 strategic locations on the CQI property. Sites were selected to define better the area of apparent contamination as well as to establish clearer background characteristics for comparison. Additionally, each boring was stratified at three predetermined elevations to ascertain the vertical distribution of soil parameters. Each of the four borings made in Phase I was repeated with an adjacent and stratified sample in Phase II as part of the total of ten.

The four groundwater monitoring wells developed in Phase I were supplemented with three new wells in Phase II. One set of wells (MW-4 and MW-4D) was established to collect discrete samples from two different aquifers. With the exception of MW-4D, each of the wells was installed in the uppermost aquifer. Well MW-4D was specifically drilled into the second aquifer so that analyses could determine whether any cross-contamination between aquifers had occurred. Approximately three weeks after well development, groundwater samples were collected from all seven wells.

As mentioned, one of the more perplexing results of the Phase I study was the characteristic of the small stream or ditch which flows along the southern boundary of the CQI plant site. To address this question three sampling points along the ditch were chosen representing water quality upstream of any plant influence, midstream near an inactive discharge pipe and immediately downstream of the plant. Samples were collected and analyzed on the same days as the groundwater program.

Quality assurance procedures were carefully followed

throughout this program and in one area procedural improvements to the Phase I study were possible. This is discussed more fully in the groundwater monitoring section. Raw data reports from the well drilling and analytical contractors are presented in the Appendices.

3.0 Soils Sampling And Analysis

A key recommendation following the Phase I investigation was an expanded investigation of soil characteristics at the CQI plant. On April 13, 1984 ten new soil borings were performed at strategic locations throughout the plant site. Borings were made with a truck-mounted rotary drill rig equipped with a hydraulic head. Soil samples were obtained using 4-inch diameter flight augers. Drilling tools were thoroughly cleaned and rinsed between boreholes to prevent cross-contamination. Samples were promptly placed in jars for transport to the analytical laboratory. Proper chain-of-custody procedures and records were maintained throughout the soil sampling process. The location of each boring is shown on the site diagram in Appendix A.

Each soil boring was stratified into three discrete samples taken at the surface, minus 2.5 feet and minus 5.0 feet. Samples were analyzed for the metals Chromium and Lead and indicator parameters pH and Alkalinity. Additionally two separate laboratory analytical methods were used to examine metal concentrations. Extraction Procedure (E.P.) Toxicity

was employed to ascertain the leaching potential of any metals present. Rigorous acid digestion was used to determine the total concentration of each metal in the sample. The results of all soil analyses are included in Appendix B.

A comparison of soil pH and Alkalinity among all boring locations reveals no distinct pattern either among sites or in vertical distribution. Concentrations of Chromium and Lead, according to the E.P. Toxicity analyses, were below detectable levels in all samples. Only when analyzing samples by acid digestion were significant metal concentrations observed.

The background levels of Chromium in the soil at CQI (by acid digestion) are in the range of 15-20 ppm. Two surface level soil samples revealed concentrations of 91 ppm and 610 ppm at locations B-13 and B-8A, respectively . All other values both in surface and subsurface samples are close to background. The source of this Chromium may have been past waste dumping in the area of these borings. Fortunately the contamination appears to be quite stable and isolated. It is of little threat to

groundwater as evidenced by no elevated concentrations below the surface and below detection in extraction procedure leachate.

The concentrations of lead in the soil samples varied widely when subjected to acid digestion. The highest level-455 ppm was found in the surface sample at B-13; a sample that yielded relatively high concentrations of Chromium as well. The much lower, but next highest value of 69 ppm was found at the surface of boring B-11 in the northeast area of the plant. As observed in the Phase I study, vehicle exhausts may contribute to surface contamination at such locations adjacent to roadways. As with Chromium, Lead in soil appears to have little impact upon groundwater. EP Toxicity analyses and subsurface concentrations are quite low and are consistent with background levels in this type of soil.

4.0 Surface Water Sampling And Analyses

The normal surface water at the CQI plant is confined to a small ditch which flows from West to East along the southern border of the property. Samples of water from the ditch were collected at three points on May 18, 1984. The samples were sealed on-site, transported to the laboratory and analyzed on May 22nd. Results of these analyses are presented in Table I and Appendix C.

Of greatest significance in the surface water study was the relatively high quality of water with respect to the parameters investigated - Chromium, Lead, COD, TDS, pH, Specific Conductance and Alkalinity. Little change in any of these parameters was observed as the water passed through the CQI property and changes in contamination which did occur tended toward improvement. A summary of results is shown in Table 4-1.

Surface Water (Ditch) Concentrations At COI

May 18, 1984

Table 4-1

	Upstream (mg/l)	Midstream (mg/l)	Downstream (mg/l)
Chromium (Total)	0.005	0.001	L.T. 0.001
Lead	0.006	0.005	0.003
COD	105	37	27
Alkalinity	444	370	458
TDS	660	540	576
pH	7.0	7.3	7.7

5.0 Groundwater Monitoring And Analysis

As part of the Phase I investigation of groundwater at the CQI facility, four monitoring wells were installed at strategic locations on the plant site. These are identified as MW-1 through MW-4 and are shown in Appendix D. The results of Phase I revealed that additional monitoring locations would be required to characterize adequately the distribution of any groundwater contamination at the site. Further, one well into a deeper aquifer was desirable to ascertain whether any cross-contamination between aquifers had occurred.

On April 30, 1984 three new wells were developed at the locations shown in Appendix A. Borings had been performed with a truck-mounted rotary drill rig equipped with a hydraulic head. The boreholes were advanced using 4-inch diameter flight augers. Drilling tools were cleaned between borings using soap and water, and rinsed with water and isopropyl alcohol to prevent cross-contamination of boreholes.

The monitoring wells consist of bottom-capped 10-foot sections of well screen joined by 2-inch I.D.

Schedule 40 PVC plastic well riser pipe casing. The well screen is a 2-inch I.D. Schedule 40 PVC plastic screen with a slot size of 0.01 inch. A filter pack consisting of clean sand and gravel was installed at the bottom of the well to within 2 to 3 feet of ground surface. A 2-foot layer of pelletized bentonite seal was then placed above the filter pack. Upon completion of the well, a cap with bolt and padlock was installed. Details of monitoring well construction are included in Appendix A.

The three new wells as shown in Appendix A, are designated MW-4D, MW-5 and MW-6. Well MW-4D is located adjacent to well MW-4 but was drilled into the second level aquifer. The screen was inserted to a depth of 27 feet, well below the "perched" groundwater which was found in the 5 ft. - 10 ft. region.

All seven wells were sampled on May 18, 1984 using individual PVC plastic bailers. Samples were placed in jars with preservatives and transported to the analytical laboratory. A chain-of-custody record was maintained with the samples.

Each groundwater sample was analyzed for TDS, COD, pH, Specific Conductance, Alkalinity, Chromium and Lead. Samples were passed through a 45-micron filter prior to analysis. The 45-micron filter was not used in the Phase I analyses. The coarser filter used in the Phase I analyses permitted some sediment to pass through. Treatment with acid released some of the metals from the sediment giving higher readings. When the finer 45-micron filter was used, the concentration levels dropped significantly. This result clearly indicated that the metals present were not water soluble.

Chromium

The concentrations of total Chromium found in the groundwater are shown in the laboratory reports in Appendix E. In addition isocons for this parameter were developed as shown in Plate 7 of Appendix D. A small increase in Chromium concentration was observed as the groundwater moves down gradient to the South end of the plant site. The highest measured concentration, however, was 0.003 mg/l which is well below the drinking water standard of 0.05 mg/l.

Lead

Measured lead concentrations ranged from 0.003 mg/l to 0.007 mg/l with no apparent pattern among well locations. The highest concentration was well below the drinking water standard of 0.05 mg/l and no information exists to suggest cause for concern. Isocons of lead concentrations are shown in Plate 8, Appendix D, and laboratory data are presented in Appendix E.

Total Dissolved Solids/Specific Conductance

Samples were analyzed for Total Dissolved Solids (TDS) and Specific Conductance (S.C.) in an attempt to establish a TDS/S.C. relationship. The results demonstrate that sound correlation exists between these parameters. A simple regression of TDS on S.C. yields the following relationship:

$$\text{S.C. (uohms/cm)} = 1.3857 \times \text{TDS (mg/l)} + 6.2078$$

or as a useful linear relationship

$$\text{TDS (mg/l)} = 0.72 \times \text{S.C. (uohms/cm)}$$

Using this equation, the concentration of dissolved inorganic salts in the groundwater can be estimated in the field with a conductivity meter. This capability may prove useful in the event any subsequent monitoring is undertaken.

The isocons for Total Dissolved Solids are shown in Plate 9 of Appendix D. Some increase above background levels may exist in the Southeast segment of the property. There is no drinking water standard for this parameter and the maximum observed concentration of 1024 mg/l is not unusual in Illinois. As shown in the laboratory report in Appendix E, much of the TDS is in the form of Alkalinity which, if necessary, is easily treated with a water softener.

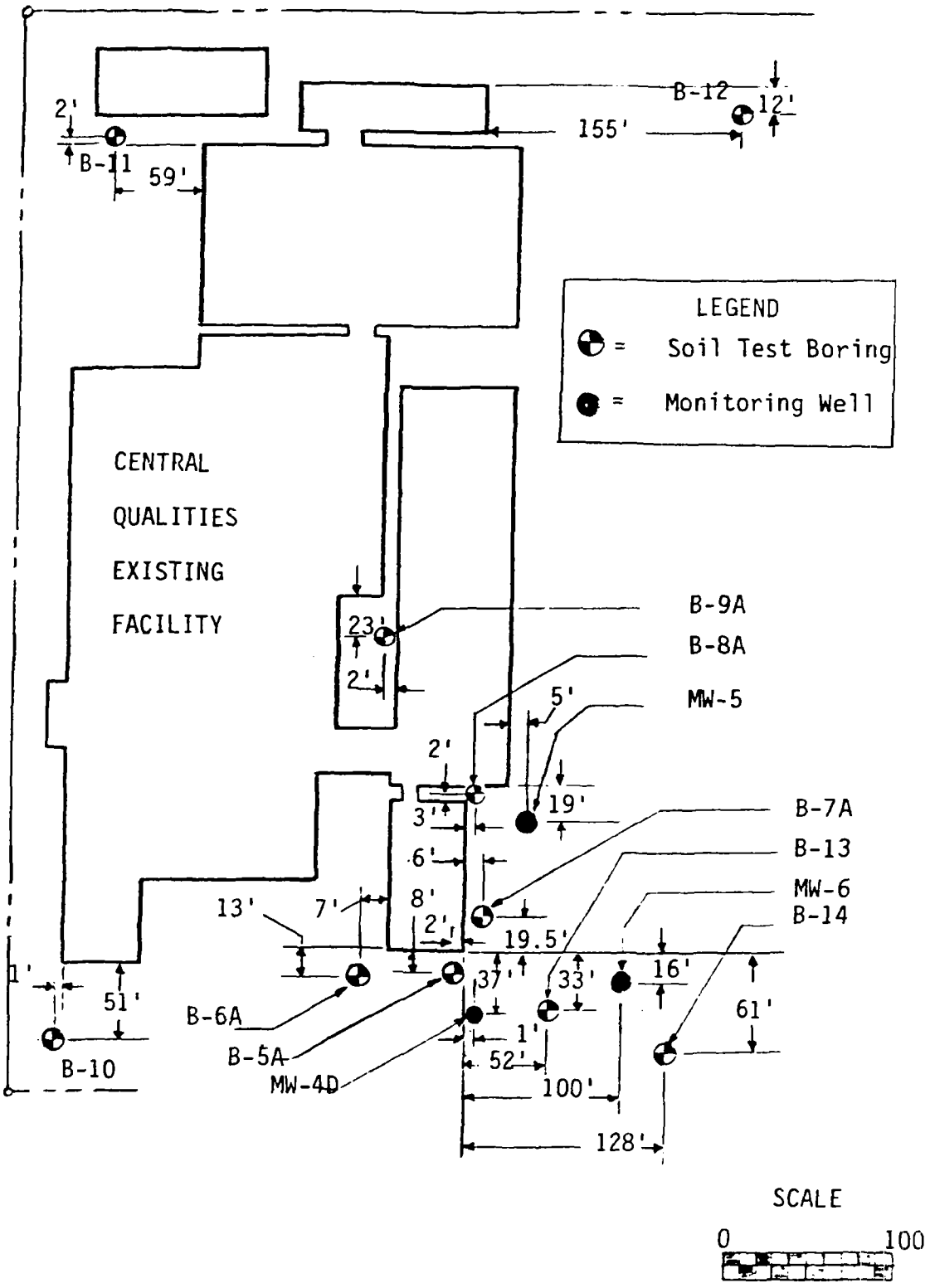
Conclusions

The results of the Phase II investigation were quite informative, particularly when coupled with the Phase I report. In general, any previous waste dumping activity at CQI has caused no long term impact in the surface water or groundwater at the Polo facility. Some surface level soil contamination by Chromium and Lead persists; but their low concentrations and stable, non-leaching, form do not present a significant concern. It is possible that any soil contamination at CQI which was conducive to leaching was flushed from the soil prior to these investigations. Further, the results from the deeper monitoring well, MW-4D show no apparent contamination at that level. The groundwater quality at the CQI site is relatively stable and should remain so with proper management practices.

APPENDICES

APPENDIX A

Drilling and Monitoring Well Information



MONITORING WELL AND BORING LOCATION DIAGRAM
CENTRAL QUALITY INDUSTRIES
POLO, ILLINOIS

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport Des Moines, IA
Kansas City Wichita, KS
Oklahoma City Tulsa, OK

RAH	1"=100'	6-9-84	783563-1

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS	:	Split Spoon—1⅜" I.D., 2" O.D., unless otherwise noted	PS	:	Piston Sample
ST	:	Shelby Tube—2" O.D., unless otherwise noted	WS	:	Wash Sample
PA	:	Power Auger	FT	:	Fish Tail
HA	:	Hand Auger	RB	:	Rock Bit
DB	:	Diamond Bit—4 in, N, B	BS	:	Bulk Sample
AS	:	Auger Sample	PM	:	Pressuremeter
HS	:	Hollow Stem Auger	DC	:	Dutch Cone
VS	:	Vane Shear			

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL	:	Water Level	WS	:	While Sampling
WCI	:	Wet Cave In	WD	:	While Drilling
DCI	:	Dry Cave In	BCR	:	Before Casing Removal
AB	:	After Boring	ACR	:	After Casing Removal

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In low permeability soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence of ground water elevations must be sought.

DESCRIPTIVE SOIL CLASSIFICATION:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50 % of their dry weight retained on a #200 sieve; they are described as: clays, or clayey silts if they are cohesive, and silts if they are slightly cohesive or non-cohesive. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their consistency and plasticity. Example: Clayey silt, trace sand *moderately plastic, stiff; silty fine sand, trace gravel, medium dense.*

GRAIN SIZE TERMINOLOGY

Major Component Of Sample	Size Range
Boulders	Over 8 in. (200mm)
Cobbles	8 in. to 3 in. (200mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 2mm)
Sand	#4 to #200 sieve (2mm to .074mm)
Silt or Clay	Passing #200 sieve (0.074mm)

RELATIVE PROPORTIONS

Descriptive Term(s) (Of Components Also Present In Sample)	Percent of Dry Weight
Trace	1-10
Little	10-20
Some	20-35
And	35-50

RELATIVE DENSITY OF GRANULAR SOILS:

N-Blows/ft.	Relative Density
0-3	Very Loose
4-9	Loose
10-29	Medium Dense
30-49	Dense
50-80	Very Dense
80+	Extremely Dense

CONSISTENCY OF COHESIVE SOILS:

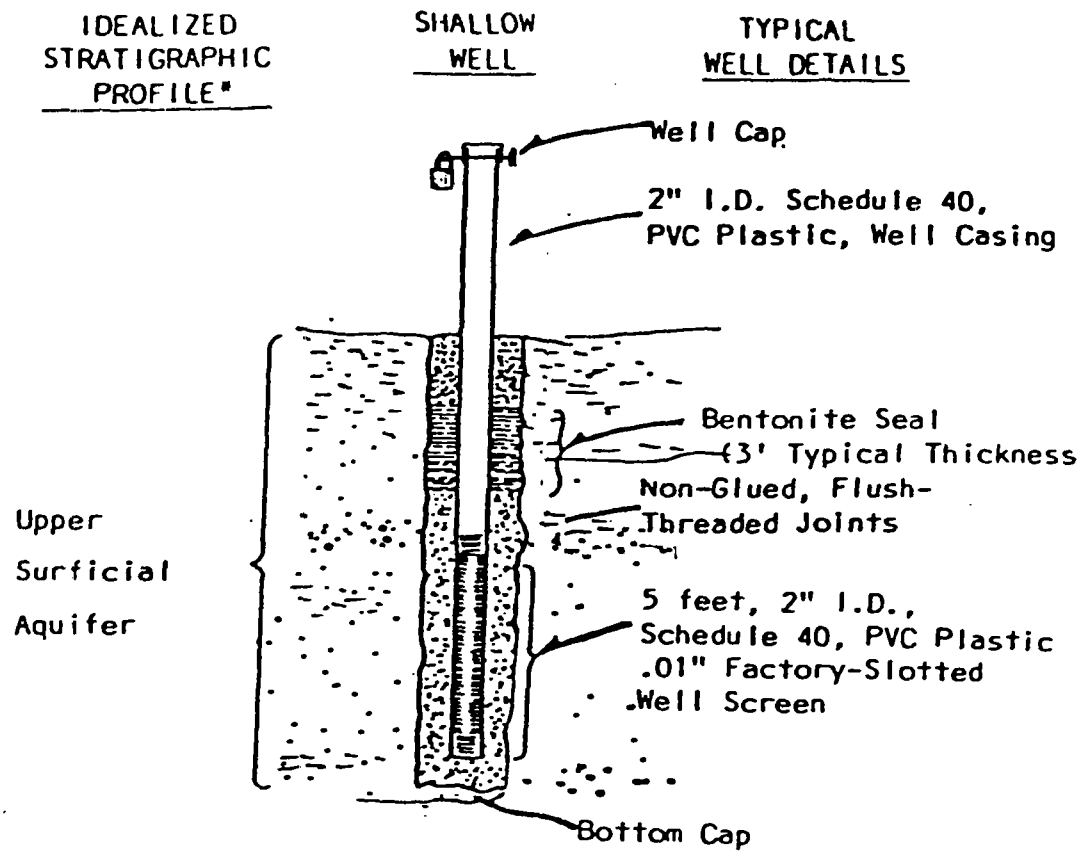
Unconfined Compressive Strength, Qu, psf	Consistency
◄ 500	Very Soft
500- 1,000	Soft
1,000- 2,000	Medium
2,000- 4,000	Stiff
4,000- 8,000	Very Stiff
8,000-16,000	Hard
► 16,000	Very Hard

PLASTICITY OF FINE GRAINED SOILS:

Term	Plasticity Index
None to slight	0- 3
Slight	4- 7
Moderate	8-25
High	► 25

MONITORING WELL INSTALLATION DETAILS

FIGURE 4



* Idealized stratigraphic profile shown; for specific profiles encountered, refer to the attached boring logs.

LOG OF BORING NO. MW4d

OWNER
CENTRAL QUALITY INDUSTRIES

ARCHITECT-ENGINEER
YATES & AUBERLE

SITE
POLO, ILLINOIS

PROJECT NAME
MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description	MONITORING WELL DETAIL
											TOP OF PIPE = 99.1 SURFACE ELEVATION = 96.3	
	PA										FILL-CLAYEY SILT TRACE ORGANICS Brown	
1	AS							CL/OL	5			
	PA										(6.0')	
2	AS										SILTY CLAY Black & Gray	
									10		(10.0')	
	PA										SILTY CLAY, TRACE SAND AND GRAVEL Brown	
3	AS							MH				
	PA								15		(17.0')	
4	AS							SM			SILTY. FINE SAND Brown	
	PA								20		(21.5')	
5	AS							CL				
	PA								25		SANDY SILTY CLAY, TRACE GRAVEL Gray	
6	AS							CL			(30.0')	
									30		BOTTOM OF BORING	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL

WATER LEVEL OBSERVATIONS

W.L.	10.5 W.S. OR W.D.	8.0 A.B.	
W.L.	B.C.R.	A.C.R.	
W.L.	5.0 (5-18-84)		

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

BORING STARTED	4-12-84
BORING COMPLETED	4-12-84
RIG 2A	FOREMAN JAF
APPROVED RKL	JOB # 783563-1

LOG OF BORING NO. MW5

OWNER	ARCHITECT-ENGINEER
CENTRAL QUALITY INDUSTRIES	YATES & AUBERLE
SITE	**PROJECT NAME**
POLO, ILLINOIS	MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description	MONITORING WELL DETAIL
											TOP OF PIPE = 100.6 SURFACE ELEVATION = 97.9	
	PA										FILL-MIXTURE OF SANDY CLAYEY SILT, CLAYEY SILT, GLASS Dark Brown and Greenish Gray	
1	AS								5		(5.0')	
	PA										CLAYEY SILT Gray	
2	AS							CL	10		(10.0')	
	PA										SANDY SILTY CLAY, TRACE GRAVEL Gray Brown	
3	AS							CL	15		(15.0')	
											BOTTOM OF BORING	
									20			

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU THE TRANSITION MAY BE GRADUAL.

WATER LEVEL OBSERVATIONS		
W.L.	10.0 W.S. OR W.D.	----- A.B.
W.L.	B.C.R.	A.C.R.
W.L.	5.1 (5-18-84)	

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

BORING STARTED	4-12-84
BORING COMPLETED	4-12-84
RIG 2A	FOREMAN JAF
APPROVED RKL	JOB #784563-1

LOG OF BORING NO. MW6

OWNER
CENTRAL QUALITY INDUSTRIES

ARCHITECT-ENGINEER
YATES & AUBERLE

SITE
POLO, ILLINOIS

PROJECT NAME
MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description	MONITORING WELL DETAIL
											TOP OF PIPE = 98.1 SURFACE ELEVATION = 96.1	
	PA											
1	AS							CL	5		FILL-CLAYEY SILT, TRACE SAND, GRAVEL, AND ORGANICS Dark Brown	
											(5.5')	
	PA										CLAYEY SILT, SLIGHTLY ORGANIC Black to Dark Brown	
2	AS							OL			(9.0')	
									10		CLAYEY SILT Gray Brown	
	PA											
3	AS							CL	15		(15.0')	
											BOTTOM OF BORING	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WATER LEVEL OBSERVATIONS			
W.L.	8.0 W.S. OR W.D.	8.0	A.B.
W.L.	B.C.R.		A.C.R.
W.L.	5.5 (5-18-84)		

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa OK

BORING STARTED	4-12-84
BORING COMPLETED	4-12-84
RIG 2A	FOREMAN JAF
APPROVED RKL	JOB #783563-1

LOG OF BORING NO. 5A

OWNER	ARCHITECT-ENGINEER
CENTRAL QUALITY INDUSTRIES	YATES & AUBERLE
SITE	**PROJECT NAME**
POLO, ILLINOIS	MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 96.7
1	AS							CL			CLAYEY SILT
	PA										Dark Brown
2	AS							CL			
	PA										(5.0')
3	AS							CL	5		
											BOTTOM OF BORING

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL.

WATER LEVEL OBSERVATIONS			
W.L.	None W.S. OR W.D.	None	A.B.
W.L.		B.C.R.	A.C.R.
W.L.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita KS
Omaha, NE
Oklahoma City Tulsa OK

BORING STARTED	4-13-84		
BORING COMPLETED	4-13-84		
RIG	2A	FOREMAN	JAF
APPROVED	RKL	JOB #	783563-1

LOG OF BORING NO. 6A

OWNER CENTRAL QUALITY INDUSTRIES	**ARCHITECT-ENGINEER** YATES & AUBERLE
SITE POLO, ILLINOIS	**PROJECT NAME** MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 96.0
1	AS										FILL-MIXTURE OF CLAYEY SILT AND CRUSHED LIMESTONE, Dark Brown
	PA										
2	AS										
	PA										(4.5')
3	AS							CL	5		(5.0') SEE NOTE #1
											BOTTOM OF BORING

NOTE #1:

CLAYEY SILT, Brown

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL.

WATER LEVEL OBSERVATIONS			
W.L.	4.5 W.S. OR W.D.	4.5 A.B.	
W.L.		B.C.R.	A.C.R.
W.L.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

BORING STARTED	4-13-84		
BORING COMPLETED	4-13-84		
RIG 2A		FOREMAN JAF	
APPROVED RKJ		JOB # 783563-1	

LOG OF BORING NO. 8A

OWNER CENTRAL QUALITY INDUSTRIES	**ARCHITECT-ENGINEER** YATES & AUBERLE
SITE POLO, ILLINOIS	**PROJECT NAME** MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 99.9
1	ST	24									FILL-CLAYEY SILT WITH CRUSHED LIMESTONE, Dark Brown
											(2.0')
2	ST	18						CL			CLAYEY SILT
3	ST	18						CL			(5.0') Brown to Gray Brown
									5		BOTTOM OF BORING

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WATER LEVEL OBSERVATIONS			
W.L.	None W.S. OR W.D.	None	A.B.
W.L.		B.C.R.	A.C.R.
W.L.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

BORING STARTED	4-13-84
BORING COMPLETED	4-13-84
RIG Hand Auger	**FOREMAN** JAF
APPROVED RKL	**JOB #** 783563-1

LOG OF BORING NO. 9A

OWNER	ARCHITECT-ENGINEER
CENTRAL QUALITY INDUSTRIES	YATES & AUBERLE
SITE	**PROJECT NAME**
POLO, ILLINOIS	MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 100.1
											(1.0') SEE NOTE #1
1	ST	24						CL			CLAYEY SILT
2	ST	18						CL			Dark Brown to Brown
3	ST	18						CL	5		(5.0')
											BOTTOM OF BORING

NOTE #1:

FILL: CRUSHED LIMESTONE AND CLAYEY SILT
Gray

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL.

WATER LEVEL OBSERVATIONS			
W.L.	None W.S. OR W.D.	None A.B.	
W.L.	B.C.R.	A.C.R.	
W.L.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

BORING STARTED	4-13-84
BORING COMPLETED	4-13-84
RIG Hand Auger	FOREMAN JAF
APPROVED RKL	JOB # 783563-1

LOG OF BORING NO. 10

OWNER	ARCHITECT-ENGINEER
CENTRAL QUALITY INDUSTRIES	YATES & AUBERLE
SITE	**PROJECT NAME**
POLO, ILLINOIS	MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 101.7
1	AS										FILL-SILTY CLAY AND CRUSHED
											(1.5') LIMESTONE, Brown & Gray
	PA										FILL-MIXTURE OF CLAYEY SILT
2	AS							CL/CH			AND SILTY CLAY, Dark Brown &
	PA										(4.0') Brown
3	AS							CL	5		(5.0') SEE NOTE #1
											BOTTOM OF BORING
											NOTE #1:
											CLAYEY SILT (TOPSOIL)
											Black to Dark Brown

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU THE TRANSITION MAY BE GRADUAL

WATER LEVEL OBSERVATIONS			
W.L.	None W.S. OR W.D.	None	A.B.
W.L.		B.C.R.	A.C.R.
W.L.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa OK

BORING STARTED	4-12-84
BORING COMPLETED	4-12-84
RIG 2A	FOREMAN JAF
APPROVED RKL	JOB #783563-1

LOG OF BORING NO. 11

OWNER
CENTRAL QUALITY INDUSTRIES

ARCHITECT-ENGINEER
YATES & AUBERLE

SITE
POLO, ILLINOIS

PROJECT NAME
MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 104.8
1	AS							OL			6" TOPSOIL
	PA										CLAYEY SILT
2	AS							CL			Brown to Dark Gray
	PA										(5.0')
3	AS							CL	5		BOTTOM OF BORING

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL.

WATER LEVEL OBSERVATIONS			
W.I.	None W.S. OR W.D.	None	A.B.
W.I.	B.C.R.		A.C.R.
W.I.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

BORING STARTED	4-12-84
BORING COMPLETED	4-12-84
RIG 2A	FOREMAN JAF
APPROVED RKL	JOB #783563-1

LOG OF BORING NO. 12

OWNER
CENTRAL QUALITY INDUSTRIES

ARCHITECT-ENGINEER
YATES & AUBERLE

SITE
POLO, ILLINOIS

PROJECT NAME
MONITORING WELL INSTALLATION

Sample No	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 99.7
1	AS										6" TOPSOIL
	PA										CLAYEY SILT
2	AS										Brown to Brown Gray
	PA										
3	AS								5		(5.0')
											BOTTOM OF BORING

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL.

WATER LEVEL OBSERVATIONS		
W.L.	None W.S. OR W.D.	None A.B.
W.L.	B.C.R.	A.C.R.
W.L.		

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

BORING STARTED	4-13-84
BORING COMPLETED	4-13-84
RIG 2A	FOREMAN JAF
APPROVED RKL	JOB # 783563-1

LOG OF BORING NO. 13

OWNER	ARCHITECT-ENGINEER
CENTRAL QUALITY INDUSTRIES	YATES & AUBERLE
SITE	**PROJECT NAME**
POLO, ILLINOIS	MONITORING WELL INSTALLATION

Sample No	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs./ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 96.2
1	AS							CL			CLAYEY SILT, TRACE SAND, GRAVEL AND ORGANICS (PROBABLE FILL) Dark Brown
	PA										
2	AS							CL			(2.5')
	PA										CLAYEY SILT
3	AS							CL	5		(5.0') Brown
											BOTTOM OF BORING

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL.

WATER LEVEL OBSERVATIONS			
W.L.	None	W.S. OR W.D.	None A.B.
W.L.		B.C.R.	A.C.R.
W.L.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa OK

BORING STARTED	4-13-84
BORING COMPLETED	4-13-84
RIG 2A	FOREMAN JAF
APPROVED RKL	JOB #783563-1

LOG OF BORING NO. 14

OWNER	ARCHITECT-ENGINEER
CENTRAL QUALITY INDUSTRIES	YATES & AUBERLE
SITE	**PROJECT NAME**
POLO, ILLINOIS	MONITORING WELL INSTALLATION

Sample No.	Type Sample	Sampling Distance	Recovery	Blows/ft.	Unconfined Compressive Strength-lbs/ft.^{2}	Water Content-%	Dry Density-lbs./ft.^{3}	Unified Class. Symbol	Depth	Elevation	Description
											SURFACE ELEVATION = 91.8
1	ST	24						CL CH			FILL-MIXTURE CLAYEY SILT WITH CRUSHED LIMESTONE
2	ST	18						CL			(2.0') Dark Brown to Brown
3	ST	18						CL	5		CLAYEY SILT (5.0') Brown to Gray
											BOTTOM OF BORING

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES IN-SITU. THE TRANSITION MAY BE GRADUAL

WATER LEVEL OBSERVATIONS			
W.L.	2.7 W.S. OR W.D.	3.0 A.B.	
W.L.	B.C.R.	A.C.R.	
W.L.			

Terracon Consultants, Inc.
Cedar Falls Cedar Rapids Davenport
Des Moines Storm Lake, IA
Kansas City Wichita, KS
Omaha, NE
Oklahoma City Tulsa, OK

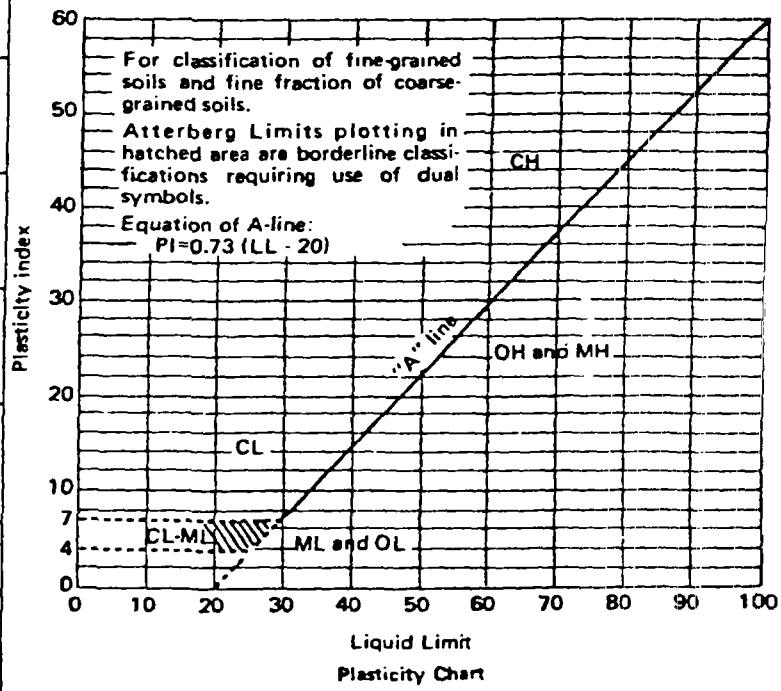
BORING STARTED	4-13-84
BORING COMPLETED	4-13-84
RIG Hand Auger	FOREMAN JAF
APPROVED RKL	JOB # 783563-1

UNIFIED SOIL CLASSIFICATION SYSTEM

Major divisions			Group symbols	Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is *larger* than No. 200 sieve size)	Gravels (More than half of coarse fraction larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
	Sands (More than half of coarse fraction is *smaller* than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4 — Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above "A" line with P.I. greater than 7
Fine-grained soils (More than half of material is *smaller* than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		Pt	Peat and other highly organic soils	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 per cent . . . . . GW, GP, SW, SP
More than 12 per cent . . . . . GM, GC, SM, SC
5 to 12 per cent . . . . . *Borderline* cases requiring dual symbols



Plasticity Chart

TERRACON CONSULTANTS, INC.

APPENDIX B

Soil Sampling

Analysis Results

SOIL SAMPLES
EP-TOX

Telephone (312) 544-3260

SUBURBAN LABORATORIES, Inc.

4140 LITT DRIVE HILLSIDE, ILLINOIS 60162 - 1183

EARL I ROSENBERG
President

H.R. THOMAS, JR.
Director

June 1, 1984

John Yates & Associates
320 South Sunset Avenue
La Grange, Illinois 60525

Attention: Mr. John Yates

Re: Terracon Consultants, Inc.
Davenport, Iowa - Soil Samples

Samples Received: 4/25/84	pH	Lead (ppm)	(ppm) Chrom-Total	(ppm as $CaCO_3$) Alkalinity
S/L #4350 - Sample #B5A-1	7.6	< 0.10	< 0.10	1086
S/L #4351 - Sample #B5A-2	7.1	< 0.10	< 0.10	1809
S/L #4352 - Sample #B5A-3	6.9	< 0.10	< 0.10	1428
S/L #4353 - Sample #B6A-1	8.1	< 0.10	< 0.10	7118
S/L #4354 - Sample #B6A-2	8.3	< 0.10	< 0.10	20725
S/L #4355 - Sample #B6A-3	8.1	< 0.10	< 0.10	2276
S/L #4356 - Sample #B7A-1	7.8	< 0.10	< 0.10	3619
S/L #4357 - Sample #B7A-2	6.85	< 0.10	< 0.10	1130
S/L #4358 - Sample #B7A-3	6.5	< 0.10	< 0.10	1010
S/L #4359 - Sample #B-10-1	8.3	< 0.10	< 0.10	19268
S/L #4360 - Sample #B-10-2	7.4	< 0.10	< 0.10	4540
S/L #4361 - Sample #B-10-3	7.3	< 0.10	< 0.10	2642
S/L #4362 - Sample #B-11-1	7.3	< 0.10	< 0.10	1761
S/L #4363 - Sample #B-11-2	6.95	< 0.10	< 0.10	1015
S/L #4364 - Sample #B-11-3	8.0	< 0.10	< 0.10	19034
S/L #4365 - Sample #B-12-1	7.5	< 0.10	< 0.10	1046
S/L #4366 - Sample #B-12-2	7.7	< 0.10	< 0.10	16526
S/L #4367 - Sample #B-12-3	7.9	< 0.10	< 0.10	19569
S/L #4368 - Sample #B-13-1	7.6	< 0.10	< 0.10	7112
S/L #4369 - Sample #B-13-2	7.5	< 0.10	< 0.10	2734
S/L #4370 - Sample #B-13-3	6.85	< 0.10	< 0.10	1323
S/L #4371 - Sample #8A-1-0-2	7.55	< 0.10	< 0.10	4148
S/L #4272- Sample #8A-2-2-3-5	6.5	< 0.10	< 0.10	1015
S/L #4373 - Sample #8A-3-3-5-5	6.6	< 0.10	< 0.10	907

(Continued)

Samples Received: 4/25/84	pH	Lead (ppm)	(ppm) Chrom-Total	(ppm as $CaCO_3$) Alkalinity
S/L #4374 - Sample #9A-1 0-2	7.4	< 0.10	< 0.10	2334
S/L #4375 - Sample #9A-2-2-3-5	5.3	< 0.10	< 0.10	404
S/L #4376 - Sample #9A-3-3-5-5	5.9	< 0.10	< 0.10	255
S/L #4377 - Sample #14-1 0-2	7.75	< 0.10	< 0.10	3640
S/L #4378 - Sample #14-2 2-3-5	7.4	< 0.10	< 0.10	1848
S/L #4379 - Sample #14-3 3-5-5	7.5	< 0.10	< 0.10	753

ANALYSIS CERTIFIED BY: _____, Director(HRT/ak)
Retyped

SOIL SAMPLES

Telephone (312) 544-3260

SUBURBAN LABORATORIES, Inc.

4140 LITT DRIVE HILLSIDE, ILLINOIS 60162 - 1183

EARL ROSENBERG
President

H.R. THOMAS, JR.
Director

May 10, 1984

John Yates & Associates
320 South Sunset Avenue
La Grange, Illinois 60525

Attention: Mr. John Yates

Re: Terracon Consultants, Inc.
Davenport, Iowa - Soil Samples

Samples Received: 4/25/84	pH	Lead (ppm)	(ppm) Chrom-Total	(ppm as $CaCO_3$) Alkalinity
S/L #4350 - Sample #B5A-1	7.6	21.0	15.0	1086
S/L #4351 - Sample #B5A-2	7.1	13.0	14.0	1809
S/L #4352 - Sample #B5A-3	6.9	12.5	16.5	1428
S/L #4353 - Sample #B6A-1	8.1	18.0	16.5	7118
S/L #4354 - Sample #B6A-2	8.3	66.5	31.5	20725
S/L #4355 - Sample #B6A-3	8.1	16.6	22.0	2276
S/L #4356 - Sample #B7A-1	7.8	60.5	23.0	3619
S/L #4357 - Sample #B7A-2	6.85	35.0	21.0	1130
S/L #4358 - Sample #B7A-3	6.5	16.5	22.0	1010
S/L #4359 - Sample #B-10-1	8.3	30.5	16.5	19268
S/L #4360 - Sample #B-10-2	7.4	15.5	15.5	4540
S/L #4361 - Sample #B-10-3	7.3	8.5	16.5	2642
S/L #4362 - Sample #B-11-1	7.3	69.0	18.5	1761
S/L #4363 - Sample #B-11-2	6.95	7.5	6.0	1015
S/L #4364 - Sample #B-11-3	8.0	14.5	17.0	19034
S/L #4365 - Sample #B-12-1	7.5	13.0	17.5	1046
S/L #4366 - Sample #B-12-2	7.7	12.0	9.00	16526
S/L #4367 - Sample #B-12-3	7.9	17.0	14.0	19569
S/L #4368 - Sample #B-13-1	7.6	455	91.0	7112
S/L #4369 - Sample #B-13-2	7.5	62.5	17.0	2734
S/L #4370 - Sample #B-13-3	6.85	44.5	16.5	1323
S/L #4371 - Sample #8A-1_0-2	7.55	32.5	610	4148
S/L #4372 - Sample #8A-2_2-3-5	6.5	8.5	6.0	1015
S/L #4373 - Sample #8A 3-3-5-5	6.6	12.0	14.5	907

(Continued)

Samples Received: 4/25/84		pH	Lead (ppm)	(ppm) Chrom-Total	(ppm as $CaCO_3$) Alkalinity
S/L #4374 - Sample #9A-1	0-2	7.4	39.0	20.5	2334
S/L #4375 - Sample #9A-2	2-3-5	5.3	14.5	16.5	404
S/L #4376 - Sample #9A-3	3-5-5	5.9	24.0	37.0	255
S/L #4377 - Sample #14-1	0-2	7.75	28.5	29.0	2640
S/L #4378 - Sample #14-2	2-3-5	7.4	14.5	12.0	1848
S/L #4379 - Sample #14-3	3-5-5	7.5	22.0	19.0	753

ANALYSIS CERTIFIED BY: _____, Director(HRT/ak)

APPENDIX C

Stream Sample

Analysis Results

SUBURBAN LABORATORIES, Inc.

CHEMICAL ANALYSTS SINCE 1936

4140 LITT DRIVE • Phone 312/544-3260 • HILLSIDE, ILLINOIS 60162

Certifications: U.S.D.A. #1783 • Ill. Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50298 • Ill. EPA #100191

ANALYSIS REPORT

NO. #5429, #5430, #5431

CLIENT

John Yates & Associates
Attn: Mr. John Yates
320 South Sunset Avenue
La Grange, Illinois 60525

P.O. No. _____

Sample Recd. 5/22/84 Tests Completed 6/1/84

SAMPLE INFORMATION

Source Re: Terracon Consultants, P.O. Box #2025, Davenport, IA. 52809, Job #783563-1

#5429 - Upstream, Proj. Polo, 5/18/84
#5430 - Midstream, Proj. Polo, 5/18/84
#5431 - Downstream, Proj. Polo, 5/18/84 (+) by HGA

Sampling Method: By Client X By Sub. Lab. _____ Serco Auto-Sampler _____ Other _____

ANALYSIS

	#5429	#5430	#5431		#5429	#5430	#5431
Total Solids mg/l				Nitrogen-Tot mg/l			
Fix. Tot. Sol. mg/l				Nitrogen-Amm mg/l			
Vol. Tot. Sol. mg/l				Nitrogen-Org mg/l			
Diss. Solids mg/l	660	540	576	Nitrite mg/l			
Settle. Sol. ml/l				Nitrate mg/l			
Tot. Sus. Sol. mg/l				Phosphate (Total) mg/l			
Fix. Sus. Sol. mg/l				Phosphate (Ortho) mg/l			
Vol. Sus. Sol. mg/l				Sulfate mg/l			
				Sulfide mg/l			
BOD mg/l				Sulfite mg/l			
COD mg/l	105	37	27	Aluminum mg/l			
DO mg/l				Antimony mg/l			
				Arsenic mg/l			
Phenols ug/l				Barium mg/l			
MBAS mg/l				Beryllium mg/l			
Oils & Greases mg/l				Boron mg/l			
				Cadmium mg/l			
Tot. Bact. Cells/100 ml				Calcium mg/l			
Tot. Coli. Cells/100 ml			(+)	Chrom-Total ppm ~~mg/l~~	0.005	0.001	/ 0.001
Fecal Coli. Cells/100 ml				Chrom-Hex. mg/l			
				Chrom-Tri. mg/l			
pH	7.0	7.3	7.7	Copper mg/l			
Spec. Cond. umhos/cm	1000	880	920	Iron mg/l			
Alkalinity mg/l as $CaCO_3$	444	370	458(+)	Lead ppm ~~mg/l~~	0.006	0.005	0.003
Acidity mg/l as $CaCO_3$				Lithium mg/l			
Tot. Hard. mg/l as $CaCO_3$				Magnesium mg/l			
Resid. Cl_2 mg/l				Manganese mg/l			
Bromide mg/l				Mercury ug/l			
Chloride mg/l				Nickel mg/l			
Fluoride mg/l				Potassium mg/l			
Cyanide-Total mg/l				Silver mg/l			
Cyanide-Free mg/l				Sodium mg/l			
				Strontium mg/l			
				Tin mg/l			
				Zinc mg/l			

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition

ANALYSIS CERTIFIED BY: _____, Director

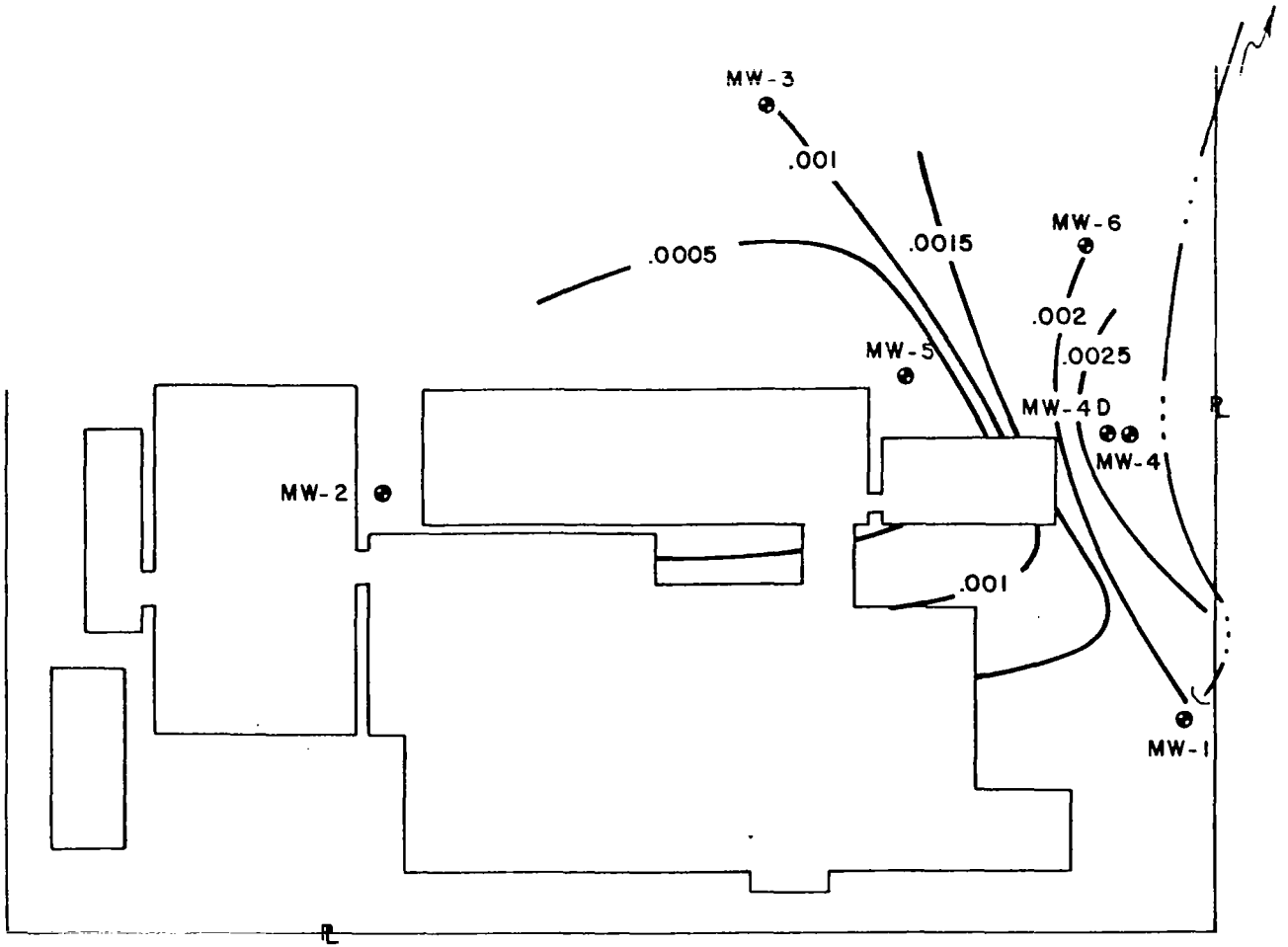
Retyped
Date 7/19/84 ak

APPENDIX D

Groundwater

Isocons

PHASE I & II LOCATIONS



N

Scale 1" = 100'
Date 7-11-84
Drawn By J.M.
Monitoring Well
Ditch

M. Rapps Associates, Inc.
Environmental Engineering

CHROMIUM (total)

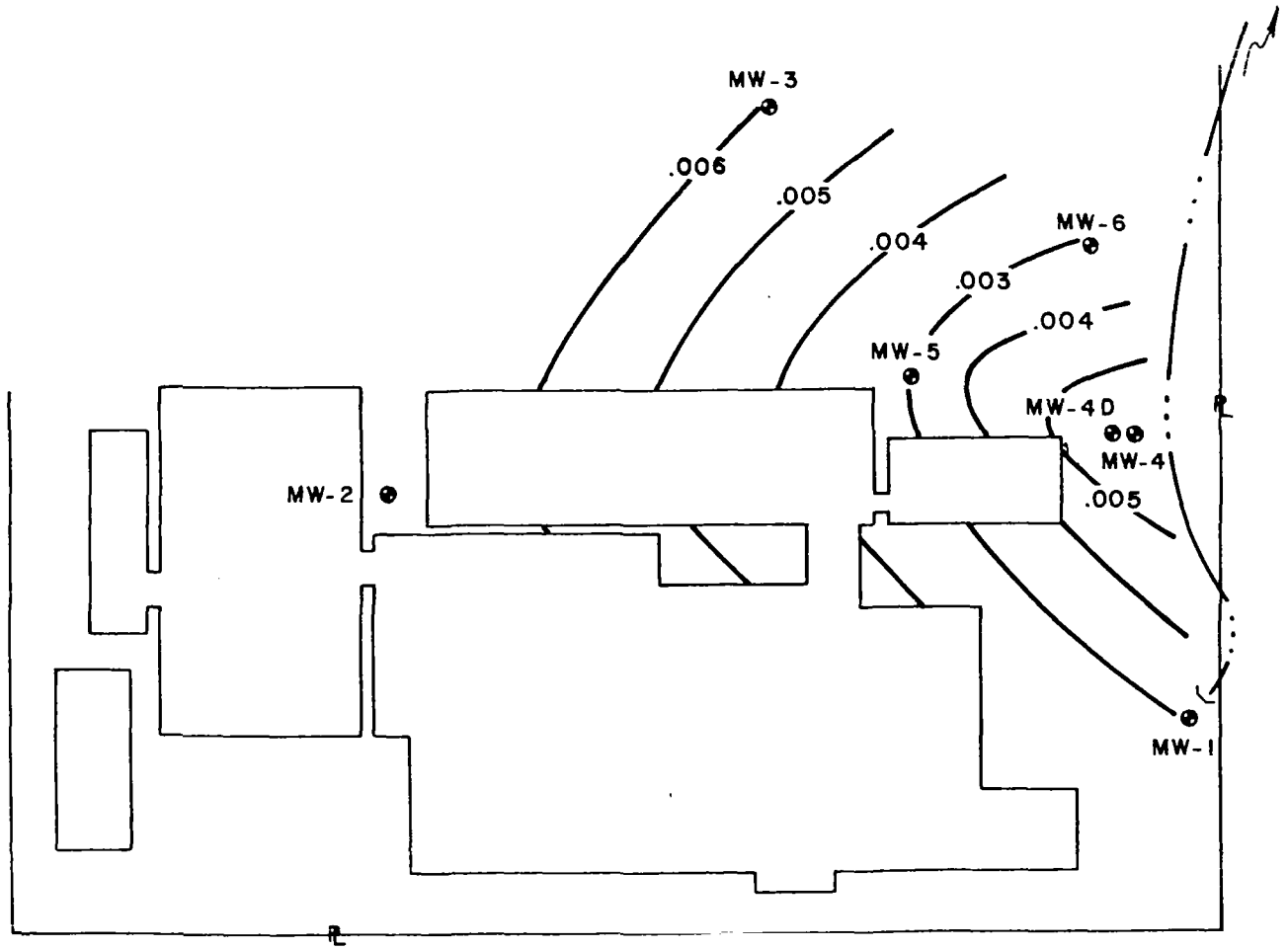
(mg/l)

Groundwater

5-18-84

PLATE 7.

PHASE I & II LOCATIONS



N

Scale 1" = 100'
Date 7-11-84
Drawn By J.M.
Monitoring Well
Ditch

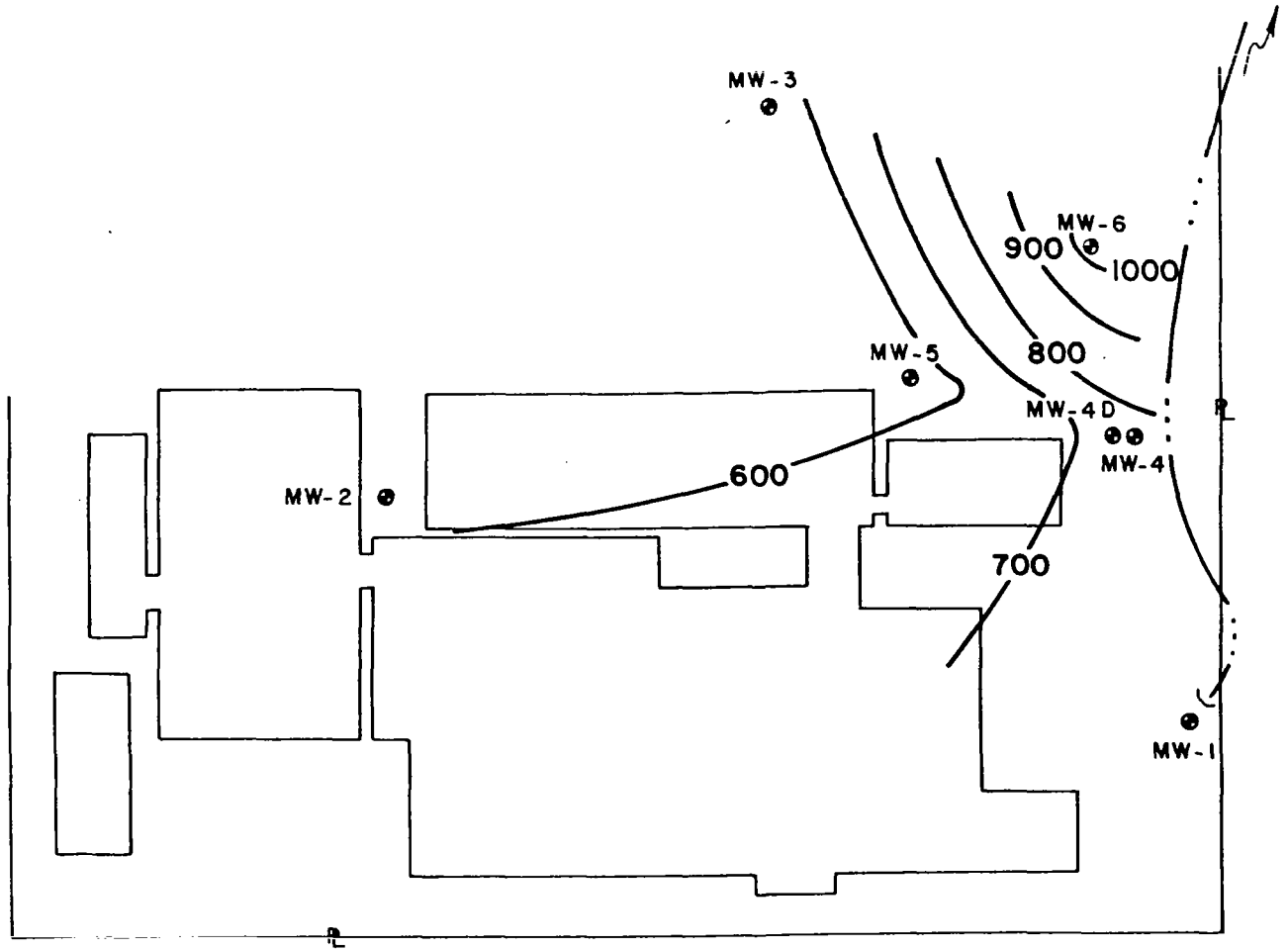
M. Rapps Associates, Inc.
Environmental Engineering

LEAD

(mg/l)
Groundwater
5-18-84

PLATE 8.

PHASE I & II LOCATIONS



N

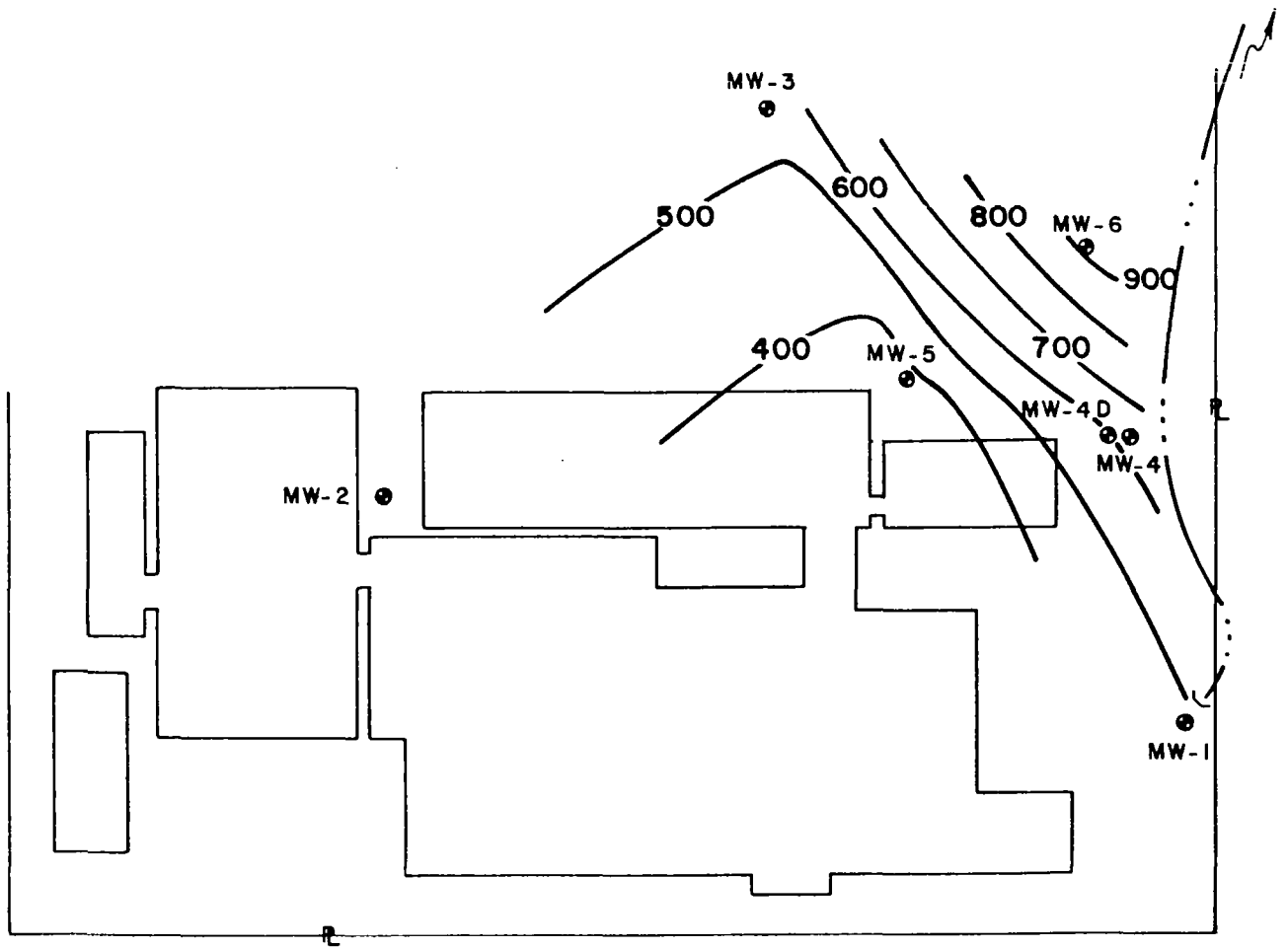
Scale 1" = 100'
Date 7-11-84
Drawn By J.M.
Monitoring Well
Ditch

M. Rapps Associates, Inc.
Environmental Engineering

T.D.S.
(mg/l)
Groundwater
5-18-84

PLATE 9.

PHASE I & II LOCATIONS



N

Scale 1" = 100'
Date 7-11-84
Drawn By J.M.
Monitoring Well
Ditch

M. Rapps Associates, Inc.
Environmental Engineering

ALKALINITY
(mg/l)
Groundwater
5-18-84

PLATE 10.

APPENDIX E

Groundwater Sample

Analysis Results

SUBURBAN LABORATORIES, Inc.

CHEMICAL ANALYSTS SINCE 1936

4140 LITT DRIVE • Phone 312/544-3260 • HILLSIDE, ILLINOIS 60162

Certifications: U.S.D.A. #1783 • Ill. Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50298 • Ill. EPA #100191

ANALYSIS REPORT

NO. #5432, #5433, #5434

CLIENT

John Yates & Associates
Attn: Mr. John Yates
320 South Sunset Avenue
La Grange, Illinois 60525

P.O. No. _____

Sample Recd. 5/22/84 Tests Completed 6/1 /84

SAMPLE INFORMATION

Source Re: Terracon Consultants, P.O. Box #2025, Davenport, Ia. 52809, Job #78356-1

#5432 - #MW-1, Proj. Polo, 5/18/84
#5433 - #MW-2, Proj. Polo, 5/18/84
#5434 - #MW-3, Proj. Polo, 5/18/84 (+) by HGA

Sampling Method: By Client X By Sub. Lab. _____ Serco Auto-Sampler _____ Other _____

ANALYSIS

	#5432	#5433	#5434		#5432	#5433	#5434
Total Solids mg/l				Nitrogen-Tot mg/l			
Fix. Tot. Sol. mg/l				Nitrogen-Amm mg/l			
Vol. Tot. Sol. mg/l				Nitrogen-Org mg/l			
Diss. Solids mg/l	764	576	556	Nitrite mg/l			
Settle. Sol. ml/l				Nitrate mg/l			
Tot. Sus. Sol. mg/l				Phosphate (Total) mg/l			
Fix. Sus. Sol. mg/l				Phosphate (Ortho) mg/l			
Vol. Sus. Sol. mg/l				Sulfate mg/l			
				Sulfide mg/l			
BOD mg/l				Sulfite mg/l			
COD mg/l	360	10	135	Aluminum mg/l			
DO mg/l				Antimony mg/l			
				Arsenic mg/l			
Phenols ug/l				Barium mg/l			
MBAS mg/l				Beryllium mg/l			
Oils & Greases mg/l				Boron mg/l			
				Cadmium mg/l			
Tot. Bact. Cells/100 ml				Calcium mg/l			
Tot. Coli. Cells/100 ml			(+)	Chrom-Total ppm ~~mg/l~~	0.002	/ 0.001	0.001
Fecal Coli. Cells/100 ml				Chrom-Hex. mg/l			
				Chrom-Tri. mg/l			
pH	7.1	7.1	7.4	Copper mg/l			
Spec. Cond. umhos/cm	1100	820	700	Iron mg/l			
Alkalinity mg/l as $CaCO_3$	470	462	538 (+)	Lead mg/l	0.003	0.007	0.006
Acidity mg/l as $CaCO_3$				Lithium mg/l			
Tot. Hard. mg/l as $CaCO_3$				Magnesium mg/l			
Resid. Cl_2 mg/l				Manganese mg/l			
Bromide mg/l				Mercury ug/l			
Chloride mg/l				Nickel mg/l			
Fluoride mg/l				Potassium mg/l			
Cyanide-Total mg/l				Silver mg/l			
Cyanide-Free mg/l				Sodium mg/l			
				Strontium mg/l			
				Tin mg/l			
				Zinc mg/l			

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition

ANALYSIS CERTIFIED BY: _____, Director

Retyped
Date 7/19/84 ak

SUBURBAN LABORATORIES, Inc.

CHEMICAL ANALYSTS SINCE 1936

4140 LITT DRIVE • Phone 312/544-3260 • HILLSIDE, ILLINOIS 60162

Certifications: U.S.D.A. #1783 • Ill. Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50298 • Ill. EPA #100191

ANALYSIS REPORT

NO. #5435, #5436, #5437

CLIENT

John Yates & Associates
Attn: Mr. John Yates
320 South Sunset Avenue
La Grange, Illinois 60525

P.O. No. _____

Sample Recd. 5/22/84 Tests Completed 6/1/84

SAMPLE INFORMATION

Source Re: Terracon Consultants, P.O. Box #2025, Davenport, Ia, 52809, Job #783563-1

#5435 - #MW-4, Proj. Polo, 5/18/84
#5436 - #MW-4d Proj. Polo, 5/18/84
#5437 - #MW-5, Proj. Polo, 5/18/84 (+) by HGA

Sampling Method: By Client X By Sub. Lab. _____ Serco Auto-Sampler _____ Other _____

ANALYSIS

	#5435	#5436	#5437		#5435	#5436	#5437
Total Solids mg/l				Nitrogen-Tot mg/l			
Fix. Tot. Sol. mg/l				Nitrogen-Amm mg/l			
Vol. Tot. Sol. mg/l				Nitrogen-Org mg/l			
Diss. Solids mg/l	760	752	552	Nitrite mg/l			
Settle. Sol. ml/l				Nitrate mg/l			
Tot. Sus. Sol. mg/l				Phosphate (Total) mg/l			
Fix. Sus. Sol. mg/l				Phosphate (Ortho) mg/l			
Vol. Sus. Sol. mg/l				Sulfate mg/l			
				Sulfide mg/l			
BOD mg/l				Sulfite mg/l			
COD mg/l	743	46	368	Aluminum mg/l			
DO mg/l				Antimony mg/l			
				Arsenic mg/l			
Phenols ug/l				Barium mg/l			
MBAS mg/l				Beryllium mg/l			
Oils & Greases mg/l				Boron mg/l			
				Cadmium mg/l			
Tot. Bact. Cells/100 ml				Calcium mg/l			
Tot. Coli. Cells/100 ml			(+)	Chrom-Total ppm ~~mg/l~~	0.002	0.003	/ 0.001
Fecal Coli. Cells/100 ml				Chrom-Hex. mg/l			
				Chrom-Tri. mg/l			
pH	6.9	6.9	6.9	Copper mg/l			
Spec. Cond. umhos/cm	1050	1080	800	Iron mg/l			
Alkalinity mg/l as $CaCO_3$	622	568	358 (+)	Lead ppm ~~mg/l~~	0.006	0.006	0.003
Acidity mg/l as $CaCO_3$				Lithium mg/l			
Tot. Hard. mg/l as $CaCO_3$				Magnesium mg/l			
Resid. Cl_2 mg/l				Manganese mg/l			
Bromide mg/l				Mercury ug/l			
Chloride mg/l				Nickel mg/l			
Fluoride mg/l				Potassium mg/l			
Cyanide-Total mg/l				Silver mg/l			
Cyanide-Free mg/l				Sodium mg/l			
				Strontium mg/l			
				Tin mg/l			
				Zinc mg/l			

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition.

ANALYSIS CERTIFIED BY: _____, Director

Retyped
Date 7/19/84 ak

SUBURBAN LABORATORIES, Inc.

CHEMICAL ANALYSTS SINCE 1936

4140 LITT DRIVE • Phone 312/544-3260 • HILLSIDE, ILLINOIS 60162

Certifications: U.S.D.A. #1783 • Ill. Dept. of Public Health #17135 • Amer. Spice Trade Assn. • F.D.A. Reg. #50296 • Ill. EPA #100191

ANALYSIS REPORT

NO. #5438

CLIENT

John Yates & Associates
Attn: Mr. John Yates
320 South Sunset Avenue
La Grange, Illinois 60525

P.O. No. _____

Sample Recd. 5/22/84 Tests Completed 6/1/84

SAMPLE INFORMATION

Source Re: Terracon Consultants, P.O. Box #2025, Davenport, Ia., Job #783563-1

#5438 - #MW-6, Proj. Polo, 5/18/84

(+) by HGA

Sampling Method: By Client X By Sub. Lab. _____ Serco Auto-Sampler _____ Other _____

ANALYSIS

	#5438				#5438		
Total Solids mg/l				Nitrogen-Tot mg/l			
Fix Tot. Sol. mg/l				Nitrogen-Amm mg/l			
Vol Tot. Sol. mg/l				Nitrogen-Org mg/l			
Diss. Solids mg/l	1024			Nitrite mg/l			
Settle. Sol. ml/l				Nitrate mg/l			
Tot. Sus. Sol. mg/l				Phosphate (Total) mg/l			
Fix. Sus. Sol. mg/l				Phosphate (Ortho) mg/l			
Vol. Sus. Sol. mg/l				Sulfate mg/l			
				Sulfide mg/l			
BOD mg/l				Sulfite mg/l			
COD mg/l	1267			Aluminum mg/l			
DO mg/l				Antimony mg/l			
				Arsenic mg/l			
Phenols ug/l				Barium mg/l			
MBAS mg/l				Beryllium mg/l			
Oils & Greases mg/l				Boron mg/l			
				Cadmium mg/l			
Tot Bact. Cells/100 ml				Calcium mg/l			
Tot Coli. Cells/100 ml			(+)	Chrom-Total ppm ~~xxxx~~	0.002		
Fecal Coli Cells/100 ml				Chrom-Hex. mg/l			
				Chrom-Tri. mg/l			
pH	7.1			Copper mg/l			
Spec. Conc. umhos/cm	1400			Iron mg/l			
Alkalinity mg/l as $CaCO_3$	928		(+)	Lead ppm ~~xxxx~~	0.003		
Acidity mg/l as $CaCO_3$				Lithium mg/l			
Tot. Hard. mg/l as $CaCO_3$				Magnesium mg/l			
Resid. Cl_2 mg/l				Manganese mg/l			
Bromide mg/l				Mercury ug/l			
Chloride mg/l				Nickel mg/l			
Fluoride mg/l				Potassium mg/l			
Cyanide-Total mg/l				Silver mg/l			
Cyanide-Free mg/l				Sodium mg/l			
				Strontium mg/l			
				Tin mg/l			
				Zinc mg/l			

Our methods are in accordance with the American Public Health Association, Standard Methods 15th Edition.

ANALYSIS CERTIFIED BY: _____, Director

Retyped

Date: 7/19/84 (ak)